

# Documented shelf-life of food products treated with ultrasound

Food matrix	US application goal	US treatment conditions	Results on shelf-life	Reference
<b>Strawberries</b>	Reduce mold growth	Powers: 30 W, 60 W, 90 W Treatment times: 5 min and 10 min	30 W and 60 W improved quality No difference between treatment times Increased shelf life of up to 3 weeks	[1]
<b>Apple juice</b>	Microbial, yeast and mold inactivation	Combined with pulsed light (3 pulses/s, pulse width of 360 $\mu$ s, 0-0.0175 J/mL) Frequency: 20 kHz Power: 600 W (80 % wave amplitude) Continuous treatment Temperature: 25 °C	Fresh-like appearance Natural apple flavor Shelf-life of 6 days	[2]
<b>Carp fillets</b> ( <i>Ctenopharyngodon idellus</i> )	Enhance mass transfer Microbial inactivation	Ultrasound-assisted chitooligosaccharides (COS) coating US medium: 1% of COS solution Frequency: 40 kHz Time treatment: 10 min	Reduction of the accumulation of TVB-N, off-taste nucleotides, BAs and the IMP degradation, inhibiting microbial growth, and maintaining sensory quality of fillets 2-day shelf life increase	[3]
<b>Fresh-cut mangoes</b>	Inactivation of polyphenol oxidase (PPO) activity	Frequency: 40 kHz Treatment time: 15 min Power: 690 W	Reduction of PPO activity responsible for fruit browning Higher vitamin C content Lower microbial counts during storage Better sensory properties	[4]

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<b>White mushroom</b> ( <i>Agaricus bisporus</i> )	Microbial and enzymatic (PPO) inactivation	Frequency: 20 kHz Power: 400 W Treatment time: 10 min	Reduced antioxidant degradation, PPO activity, weight loss and microbial growth Best results when combining the US with hydrogen peroxide	[5]
<b>Fresh-cut bell pepper</b>	Microbial inactivation	Combined with slightly acidic electrolyzed water (SAEW) and mild heat (60 °C) Frequency: 40 kHz Acoustic energy density: 400 W/L Treatment time: 1 min	No impact on quality during storage Prolonged the shelf-life up to 8 days at 4 °C and 30 h at 25°C	[6]
<b>Pear juice</b>	Microbial inactivation	Combined with mild temperature (25, 45, 65 °C) Frequency: 20 kHz Power: 750 W Treatment time: 10 min	Improved the shelf life of the juice by 25% at 25 °C and 45% at 45 °C Higher retention of bioactive compounds	[7]
<b><i>Semitendinosus</i> Beef</b>	Impact on the physicochemical characteristics	Frequency: 40 kHz Power: 11 W/cm <sup>2</sup> Treatment time: 60 min	Effective microbial inactivation Increased the brightness Low color change during storage No significant effect on water holding capacity and drip loss Prolonged shelf-life	[8]
<b>Prebiotic-rich strawberry juices</b>	Microbial inactivation	Frequency: 40 kHz Power: 180 W Treatment time: 15 and 30 min	Retained the fresh-like attributes No negative impact on ascorbic acid content and physicochemical quality Greater total phenolic content Prolonged the shelf-life up to 4 days	[9]

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<b>Vacuum packaged potato strips</b>	Microbial inactivation	Combined with citric acid (20 g/L) Frequency: 40 kHz Power: 200 W Treatment time: 5 min	Inhibited microbial growth Maintained the visual appearance and texture Shelf-life of 12 days	[10]
<b>Almond milk</b>	Microbial inactivation and sublethal injury	Frequency: 20 kHz Power: 130 W (20-80 %) Treatment time: 2-8 min Final temperature: < 40°C	Microbial inactivation (4.4 CFU/mL) Lowered the growth rate It could result in a longer shelf-life	[11]
<b>Carrot juice</b>	Microbial inactivation	Combined with mild heat (50, 54, 58 °C/ 10 min) Frequency: 40 kHz Amplitude: 120 µm	Increase in shelf life by 20, 40 and 60 % at 50, 54 and 58 °C Increased total carotenoids, phenolic compounds and antioxidant activity	[12]
<b>5% coconut oil o/w emulsions</b>	Emulsion stability	Power: 270 W Treatment time: 7 min	Average particle size of o/w emulsions were smaller Emulsion stability up to 30 days	[13]
<b>Fresh radish (<i>Raphanus raphanistrum</i> subsp. <i>sativus</i>)</b>	Microbial inactivation	Combined with lactic acid (1% and 2%) Frequency: 30 kHz Power: 100 W 25%, 50%, and 75% amplitude levels Treatment time: 15 and 30 min	Improvement of total phenolic content and firmness Microbial inactivation of 3 and 7 log after 15 and 30 min of treatment It could result in a longer shelf-life	[14]

\*TVB-N: volatile base nitrogen

\*IMP: inosine monophosphate

**For questions about this table, please contact:**

Ignacio Álvarez ([ialvalan@unizar.es](mailto:ialvalan@unizar.es))

Guillermo Cebrián ([guiceb@unizar.es](mailto:guiceb@unizar.es))

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